PROPOSED REMEDIAL ACTION PLAN
PROVAN FORD SITE
Environmental Restoration Project
Newburgh, Orange County, New York
Site No. B00127-3

February 2005

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

A 1996 Clean Water/Clean Air Bond Act
Environmental Restoration Project

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SECTION 1: <u>SUMMARY AND PURPOSE OF THE PROPOSED PLAN</u>

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Provan Ford Site. The presence of hazardous substances has created threats to human health and/or the environment that are addressed by this proposed remedy.

The 1996 Clean Water/ Clean Air Bond Act provides funding to municipalities for the investigation and cleanup of brownfields. Brownfields are abandoned, idled or under-used properties where redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. Brownfields often pose not only environmental, but legal and financial burdens on communities. Under the Environmental Restoration (Brownfields) Program, the state provides grants to municipalities to reimburse up to 90 percent of eligible costs for site investigation and remediation activities. Once remediated the property can then be reused.

As more fully described in Sections 3 and 5 of this document, the washing, service and maintenance of tanker trucks have resulted in the disposal of hazardous substances, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and petroleum wastes. These hazardous substances have contaminated the soil, groundwater and soil vapor at the site, and have resulted in:

- a threat to human health associated with potential exposure to contaminated soil, groundwater and soil vapor.
- an environmental threat associated with the impacts of contaminants to the groundwater.

To eliminate or mitigate these threats, the NYSDEC proposes the following remedy to allow for commercial/industrial use of the site:

- A remedial design program to provide the details necessary to implement the remedial program.
- A pre-design investigation to determine the extent of off-site groundwater and vapor contamination.
- Demolition of the former Provan Ford operations building and wash rack.
- Excavation of subsurface soils impacted with VOCs or light non-aqueous phase liquid (LNAPL).
- LNAPL recovery from open excavation areas.

- Off-site treatment/disposal of excavated soil and LNAPL to an appropriate, NYSDEC approved disposal facility.

- Removal, cleaning and off-site disposal of the 8,000 gallon underground storage tank (UST) present under the wash rack area.

- Backfill excavated areas with clean fill.

- Treatment of on-site groundwater using *in situ* chemical oxidation.

- Covering all vegetated areas with clean soil and all non-vegetated areas with either concrete or a paving system.

- Development of a site management plan to address residual contamination and any use restrictions.

- Imposition of an environmental easement.

- Annual certification of the institutional and engineering controls.

- Operation of the remedial components until achievement of remedial objectives or technical impracticability.

- Institution of a long term monitoring program.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The NYSDEC will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The NYSDEC has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the February 2005 "Site Investigation/Remedial Alternatives Report (SI/RAR)", and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Newburgh Free Library
124 Grand Street
Newburgh, NY 12550
Phone: (845) 563-3601
Hours: Mon- Thu 9:00 am - 9:00 pm
Fri & Sat 9:00 am - 5:00 pm
Sun 1:00 pm - 5:00 pm

NYSDEC Region 3 Office
21 South Putt Corners Road
New Paltz, New York 12561-1696
Contact: Mike Knipfing
Phone: (845) 256-3154
Hours: Mon-Fri 8:30 am - 4:45 pm

NYSDEC
625 Broadway
Albany, New York 12233-7015
Contact: David Camp, Project Manager
Phone: (518) 402-9622
Hours: Mon-Fri 8:30 am - 4:45 pm

The NYSDEC seeks input from the community on all PRAPs. A public comment period has been set from February 11, 2005 to March 28, 2005 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for March 7, 2005 at the City of Newburgh Multipurpose Activity Center, Delano Hitch Park, 401 Washington Street, Newburgh beginning at 7:00 p.m.

At the meeting, the results of the SI/RAR will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Camp at the above address through March 28, 2005.

The NYSDEC may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the NYSDEC's final selection of the remedy for this site.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Provan Ford Site is located at 146-172 Mill Street in the City of Newburgh, Orange County, as shown on Figures 1 and 2. The site is situated on approximately 3.5 acres and contains the former Provan Ford operations building. The building construction is slab-on-grade and concrete block with a footprint of approximately 18,000 square feet, used primarily for garage and storage space. The remainder of the site is mostly asphalt paved, with some gravel covered areas and an earthen covered area on the northwest end. A truck wash area, consisting of two concrete pads and large steel truck wash rack, used for washing tank trucks, is located immediately west of the building. The surrounding area is mixed residential and commercial. Ridgewood Corp. borders the site on the south. Gary's Truck & Trailer Repair and a residential area are located to the southeast. Quassaick Creek is located approximately 700 feet to the south and the Hudson River is located approximately 4000 feet east of the site.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The property was initially developed in the 1940s as a commercial facility and expanded in the 1950s. Provan Ford is the original occupant and has operated at the site for over 50 years as a large truck dealership/repair facility and a petroleum/industrial tanker cleaning facility. Housekeeping practices diminished in later years with the occurrence of various incidents at the facility involving discharges of petroleum and other liquid substances to the ground, to the facility's floor drains, and to the City's municipal sewer system. The on-site drainage system was connected to the City's combined sewer system which ultimately discharged to the Hudson River. On-site oil-water separators were also not properly maintained. The facility has past violations of the City's pretreatment ordinance for oil and grease and discharge of potentially flammable products to the City's sewer collection system. Large explosions and fires were reputedly attributed to discharges from the site. An adjacent structure was destroyed by fire after a series of explosions within the City's sewer system. The NYSDEC responded to several spill related incidences at the facility. These included on-site spills, chemical odors reported by adjacent businesses, and fumes in City sewers.

Provan vacated the property in 1998 as the result of tax foreclosure. On June 29,1999, the City of Newburgh took ownership. Gary's Heavy Truck Repair occupied the property from March 1998 to March 2000. The site is currently vacant.

3.2: Remedial History

In June of 1998 the United State Environmental Protection Agency (USEPA) sampled over 50 drums of liquid wastes identified at the site as part of a potential removal action. Some of the drums were leaking and previously spilled over. A NYSDEC contractor secured and staged the drums on-site and cleaned up the spilled material, stockpiling the impacted soil on-site. The contractor also pumped liquids out of an oil-water separator, overflowing waste oil tank and leaking free standing tanks and disposed of the liquids at an off-site treatment facility.

An initial investigation was conducted by First Environment on the behalf of the City of Newburgh in October 1999. Work included the collection and analysis of soil and soil boring samples and installation and analysis of seven groundwater piezometers. This investigation provided a baseline for soil and groundwater quality at the site. During this investigation approximately 60 tons of previously stockpiled soil was characterized and transported to an off-site disposal facility. In addition, nine of the drums staged on site were leaking and were over packed. The results of the initial investigation are contained in the Site Investigation/Remedial Alternatives Report Work Plan, dated July 2000.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past owners and operators, waste generators, and haulers.

Since no viable PRPs have been identified, there are currently no ongoing enforcement actions. However, legal action may be initiated at a future date by the state to recover state response costs should PRPs be identified. The City of Newburgh will assist the state in its efforts by providing all information to the state which identifies PRPs. The City will also not enter into any agreement regarding response costs without the approval of the NYSDEC.

SECTION 5: SITE CONTAMINATION

The City of Newburgh has recently completed a site investigation/remedial alternatives report (SI/RAR) to determine the nature and extent of any contamination by hazardous substances at this environmental restoration site.

5.1: Summary of the Site Investigation

The purpose of the SI was to define the nature and extent of any contamination resulting from previous activities at the site. The SI was conducted between August 2000 and June 2004. The field activities and findings of the investigation are described in the SI report.
The following activities were conducted during the SI:

- Research of historical information;
- Collection of 20 subsurface soil locations and 2 background locations;
- Collection of 31 discrete soil samples using a direct push technique;
- Collection of 37 subsurface post-excavation soil samples from tank excavations;
- Installation of 17 soil borings and 17 monitoring wells for analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of 20 new and existing monitoring wells and piezometers;
- A survey of public and private water supply wells in the area around the site; and
- Collection of 21 soil vapor samples. Collection of 2 indoor air samples. Collection of 1 outdoor air sample.

To determine whether the soil and groundwater contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".

Based on the SI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the SI report.

5.1.1: Site Geology and Hydrogeology

The site is underlain by up to seven feet of fill consisting of sand, silt, and gravel with traces of building debris. Below the fill are alternating layers of sand and silt with discontinuous clay or silt layers identified at several locations. Bedrock was encountered at depths of approximately 47 to 50 feet. The bedrock consists of graywacke, a course grained sandstone with poorly sorted pieces of shale.

Groundwater occurs at the site at depths ranging from 6 to 15 feet below grade, depending on location and seasonal variations. Both the overburden and bedrock groundwater flow to the southeast. A very slight downward vertical gradient was observed between the shallow and intermediate wells, while an upward gradient was observed at all locations between bedrock and intermediate wells.

5.1.2: Nature of Contamination

As described in the SI report, many soil, groundwater and soil gas samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganics (metals).

The VOCs of concern are petroleum related compounds including benzene, toluene, ethylbenzene and xylenes (BTEX) and chlorinated solvents including 1,1,1-trichloroethane (TCA), trichloroethene (TCE), tetrachloroethene (PCE) and their breakdown products. SVOCs identified on site consist of a number of polycyclic aromatic hydrocarbons (PAHs). While metals were found slightly above SCGs, they are naturally occurring and most likely attributable to local soil background conditions.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (ppm) for soil and micrograms per cubic meter ($\mu g/m^3$) for air samples. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern in soil, groundwater, and soil vapor and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Waste Materials

Contaminant source areas are associated with the former UST areas and the wash rack area. Free product or light non-aqueous phase liquid (LNAPL) was observed in the vicinity of all USTs and under the building slab. The LNAPL on-site is generally petroleum based, but may contain dissolved chlorinated solvents. In the former 5,000 gallon USTs area, LNAPL was observed during the tank removals and in monitoring well MW-3. LNAPL was also identified under the building slab in MW-9, and was tentatively identified as diesel oil. LNAPL thickness in this well was measured at a maximum of 3.7 feet. The source of this contamination may be the wash rack area behind the building. Three piezometers were installed under the building slab (PZ-8, PZ-9 and PZ-10) to determine the extent of the LNAPL observed in MW-9, but only a sheen was observed in these piezometers. LNAPL was also identified downgradient of the building in PZ-3 and MW-7. The LNAPL in MW-7 was tentatively identified as No. 2 fuel oil and may be related to the former fuel oil spill near PZ-3.

Subsurface Soil

Shallow soil samples were collected from 0 to 6 inches and 6 to 12 inches below pavement/gravel and analyzed for SVOCs and metals. Samples were collected around the building and UST areas. Most locations exceeded SCGs for various SVOCs and metals. Carcinogenic PAHs were the primary SVOCs detected above SCGs. Heavy metals included chromium, lead, nickel and zinc, but are not necessarily site related. SVOC and metal concentrations increased slightly in the 6 to 12 inch samples.

Deep soil samples were collected from depths ranging from 5 to 16 feet below grade. The primary contaminants of concern are VOCs. Samples were collected from UST excavations, soil borings, and monitoring well borings. Total VOC detections range from non-detect to 3,042 ppm, well above the SCG of 10 ppm. The approximate extent of the VOC contamination is shown on Figure 3. BTEX compounds were identified adjacent to or underlying each of the former USTs and underlying the wash rack area. Chlorinated VOCs were identified underlying the two 5,000 gallon waste oil USTs, but also at lower concentrations adjacent to the trench drain for the wash rack. In general, concentrations are highest approximately 8 to 10 feet below grade, extending down to 14 to 16 feet below grade, which roughly corresponds to the seasonal fluctuation of the water table.

Groundwater

Twenty on-site wells and piezometers were sampled during the site investigation. The majority of these are screened at the water table, but four wells are screened 25-30 feet below these and four wells are installed into bedrock. Concentration contours for total chlorinated compounds and total BTEX are shown on Figures 4 and 5, respectively.

The highest VOC concentrations in the groundwater were detected in the wash rack area in PZ-7. Chlorinated VOCs totaled 68,170 ppb and BTEX totaled 3,290 ppb. Levels decreased in the intermediate well, MW-10I, to 523 ppb total chlorinated VOCs and 15 ppb BTEX. VOC concentrations were also high near the two former 5000 gallon USTs. Chlorinated VOCs totaled 50,300 ppb in MW-3 decreasing to 2,120 ppb in MW-3I. BTEX compounds were also detected up to 1,900 ppb in MW-3, but not in the intermediate well. The two chlorinated VOC plumes sink and converge in the southeast corner of the site as the intermediate wells were primarily impacted in the downgradient wells. 2,660 ppb total chlorinated VOCs were detected in the furthest downgradient well, MW-11I , indicating that the plume likely extends off site. The BTEX plume, however, does not appear to extend off site as no BTEX was detected in this well. BTEX contamination is also present in the vicinity of the former 8000 gallon gasoline UST and 10,000/20,000 gallon UST areas. BTEX was detected up to 42,000 ppb in MW-5 and 45,700 ppb in MW-7. No chlorinated VOCs were detected in these wells during the latest sampling round (October 2003).

VOCs were not detected in any of the bedrock monitoring wells indicating the contamination is confined to the overburden aquifer.

Soil Vapor/Air

Soil vapor samples were collected in the southeast portion of the site near the property boundary to determine if VOCs were potentially migrating off-site through the soil vapor. Sample locations and results are shown on Figure 6. Initially 21 samples were collected in 2001 and analyzed for BTEX compounds and total VOCs. Additional soil vapor testing was conducted in 2003 to evaluate if the site could be impacting the adjacent Ridgewood plumbing supply building. Concentrations were generally low near the property boundary, except for sample SG-4A with total VOCs detected at an estimated 1,987 $\mu g/m^3$. Two air samples were collected within the Ridgewood warehouse and one outside (ambient air) sample was collected using Summa canisters. Several VOCs were detected in the indoor air samples including benzene (up to 214 $\mu g/m^3$) and cis 1,2-DCE (at 20 $\mu g/m^3$), the only chlorinated VOC detected. At this time, it is unclear whether the detection of these chemicals in the indoor air at Ridgewood Plumbing is a result of vapor intrusion or a result of the presence of commercial plumbing products stored on-site. Additional investigation and/or mitigation will be completed as part of the pre-design investigation proposed in this PRAP.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the SI/RAR. The following IRMs were conducted as part of this investigation during November 2000 (the drum removal) and June and July 2001 (all other IRMs):

- Characterization and disposal of 78 drums previously identified on site. Nine of the drums were characterized and disposed as hazardous waste, with the remainder disposed as non-hazardous waste.

- Removal and off-site disposal of a 10,000 gallon gasoline UST and adjacent 20,000 gallon diesel UST. Both tanks had leaked and adjacent soil was excavated to remove visible petroleum contaminated soil surrounding the tanks. The excavation was completed to a maximum depth of 14 feet and approximately 10 feet beyond the limits of the USTs in all directions. The excavated soil was disposed off site.

- Removal and off-site disposal of a 4,000 gallon gasoline UST, associated piping and gasoline dispensers. The UST had several holes and heavily contaminated soil surrounding the tank was excavated to a depth of 9.5 feet and disposed off site.

- Removal and off-site disposal of two 5,000 gallon waste oil USTs. Product was observed in the excavation and grossly contaminated soil was removed to a depth of 11 feet and disposed off site.

- Removal and off-site disposal of a 550 gallon heating oil UST. The tank had several holes and contaminated soil associated with the tank was excavated to a depth of 5.5 feet and disposed off site.

- Pumping and off-site disposal of the contents of an 8,000 gallon fuel oil UST. This tank is partly below the groundwater table and currently empty; therefore, it appears to be sound. The wash rack is constructed above this tank which is currently preventing the removal of this UST.

- Cleaning and removal of the interior oil-water separator.

- Cleaning and removal of storm drains and approximately 190 feet of piping leading to the exterior oil-water separator. The oil-water separator was also cleaned and, although disconnected from service, remains on site for potential future use.

- Cleaning of floor drains within the building. After cleaning the floor drains were sealed with concrete.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Appendix 6 of the SI/RA report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Pathways which are known to or potentially exist at the site include:

Soil

- Direct contact with surface soil contaminated with volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) are potential exposure pathways for trespassers. However, exposure of trespassers to contaminated soil is not expected since most of the site is paved or covered with gravel. Additionally, those areas that are not paved are covered with brush thereby limiting access to unpaved areas.

- During excavation work, construction workers could come in to direct contact with contaminated sub-surface soil, potentially resulting in dermal exposures or exposure through the inhalation of soil particles.

Groundwater

- Ingestion of contaminated groundwater is a potential pathway at this site. However, the facility and the surrounding neighborhood are supplied with public water. Therefore, ingestion of contaminated groundwater is not expected.

Ambient (Outdoor) Air

- Inhalation of VOCs and particulates is a potential exposure pathway for nearby businesses and residences during excavation and demolition activities. However, a Community Air Monitoring Plan implemented during demolition and intrusive activities would minimize inhalation exposures.

Indoor Air

- Inhalation of volatile organic compounds in indoor air that are a result of vapor intrusion is a potential exposure pathway at this site. However, the on-site building is currently vacant.

- Inhalation of volatile organic compounds in indoor air that are a result of vapor intrusion is a potential exposure pathway at nearby off-site properties. This exposure pathway will be further investigated in the future.

5.4: <u>Summary of Environmental Impacts</u>

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

No current pathways for environmental exposure have been identified for this site. The nearest creek is 700 feet south of the site and is not receiving drainage from the site. The exterior oil-water separator previously discharged to the City storm sewer which released into the Hudson River, but has been cleaned and disconnected from service. Site contamination has impacted the groundwater resource in the overburden aquifer. While this aquifer is not used as drinking water in vicinity of the site, it is considered a resource.

SECTION 6: <u>SUMMARY OF THE REMEDIATION GOALS AND THE PROPOSED USE OF THE SITE</u>

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous substances disposed at the site through the proper application of scientific and engineering principles.

The proposed future use for the Provan Ford Site is commercial/industrial.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- the presence of NAPL as a source of soil, groundwater and soil vapor contamination;
- exposures of persons at or around the site to VOCs in soil, soil vapor and groundwater;
- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and
- the release of contaminants from subsurface soil and groundwater into indoor air through soil vapor; and
- off-site migration of groundwater that does not attain groundwater quality standards.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards and
- SCGs for subsurface soil.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements. Potential remedial alternatives for the Provan Ford Site were identified, screened and evaluated in the RA report which is available at the document repositories identified in Section 1.

All of the remedial alternatives evaluated (except no further action) include the demolition of the on-site building and wash rack and excavation of heavily impacted soil and LNAPL with off-site treatment and disposal. Demolition of the building will allow efficient removal of the area of LNAPL which originates under the wash rack and extends under the building. Excavation is considered the only practical means for removal of LNAPL from soil and the groundwater interface.

All of the action alternatives also include measures to mitigate any vapor intrusion impacts in adjacent off-site buildings, which may be identified during the remedial design, or future on-site buildings during site redevelopment.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated soil, groundwater, and soil gas at the site.

Alternative 1: No Further Action

Present Worth: *$323,000*
Capital Cost: *$0*
Annual OM&M:
(Years 1-30): *$21,000*

The No Further Action alternative recognizes remediation of the site conducted under previously completed IRMs. To evaluate the effectiveness of the remediation completed under the IRM, only continued monitoring is necessary. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2: Soil Excavation\SVE, Groundwater Air Sparging, Site Cover

Present Worth: *$1,510,000*
Capital Cost: *$1,320,000*
Annual OM&M:
(Years 1-5): *$36,000*
(Years 6-7): *$21,000*

This alternative would involve excavation to remove heavily impacted soils and LNAPL from source areas with transport off site for treatment/disposal, and a combination of soil vapor extraction (SVE)/air sparging to treat the remaining VOC-impacted soil to SCGs and contaminated groundwater to groundwater standards. An estimated 4,600 cubic yards of soil would be excavated from the wash rack and former UST areas (ranging from depths of approximately 5 to 16 feet below grade). The building and wash rack would be demolished to allow access to contamination under those areas and the 8,000 gallon UST under the wash rack would be excavated, cleaned and disposed off site. Excavated areas would be backfilled with clean fill.

Remaining soil, in excess of SCGs, would be treated by SVE and the groundwater contamination would be treated by air sparging. SVE is an *in situ* process where VOCs present in unsaturated soil are removed by physically applying a vacuum to the subsurface. The vacuum creates air movement and VOCs are drawn through a vapor treatment system. Air sparging involves the injection of air into the groundwater through a series of injection wells to strip VOCs out the groundwater. The air injected would be collected by the SVE wells and treated through that system.

This alternative would include a site cover to limit contact with residual SVOC-contaminated soil and would include measures to mitigate any vapor intrusion impacts in adjacent off-site buildings identified during the remedial design. In addition, a site management plan would be developed stipulating development and usage restrictions. It is estimated that this alternative could be designed in 6 months, implemented in four to six weeks and would meet remediation goals within 3 to 5 years. A pilot test would be required to determine the effectiveness of this technology under site conditions.

Alternative 3: Soil Excavation, *In Situ* Groundwater Chemical Oxidation, Site Cover

Present Worth: *$1,580,000*
Capital Cost: *$1,430,000*
Annual OM&M:
(Years 1-2): . . . . *$61,000}*
(Years 3-4): *$21,000*

This alternative would involve excavation to remove LNAPL and all VOC-impacted soil in excess of SCGs from source areas with transport off site for treatment/disposal, and groundwater treatment with *in situ* chemical oxidation. *In situ* chemical oxidation would involve the subsurface introduction of oxidizing agents, such as potassium permanganate, to degrade organic constituents in groundwater to innocuous substances such as carbon dioxide, water and inorganic chloride. The groundwater would be treated by delivering the oxidant into the aquifer by a network of vertical injection wells. Injection wells would be located near source areas and the southeast corner of the site to treat groundwater on site and a short distance off site.

An estimated 5,800 cubic yards of soil would be excavated under this alternative consisting of soil from the wash rack and UST areas, similar to Alternative 2, but including all VOC-impacted soil to SCGs. As in Alternative 2, the building and wash rack would be demolished to allow access to contamination under those areas and the 8,000 gallon UST under the wash rack would be excavated, cleaned and disposed off site. Excavated areas would be backfilled with clean fill.

Similar to Alternative 2, this alternative would also include a site cover to limit contact with residual SVOC-contaminated soil and would include measures to mitigate any vapor intrusion impacts in adjacent off-site buildings identified during the remedial design. In addition, a site management plan would be developed stipulating development and usage restrictions. It is estimated that this alternative could be designed in 6 months, with implementation over a one to two year period to meet remedial objectives. A pilot test would be required to determine the effectiveness of *in situ* chemical oxidation under site specific conditions and contaminants present.

Alternative 4: Soil Excavation, Groundwater Extraction and Treatment, Site Cover

Present Worth: *$2,820,000*
Capital Cost: *$1,640,000*
Annual OM&M:
(Years 1-10): *$150,000*
(Years 11-12): *$21,000*

This alternative would involve excavation to remove LNAPL and VOC-impacted soil in excess of SCGs from source areas with transport off site for treatment/disposal, and groundwater extraction and treatment. The soil excavation would consist of the same methods, areas and volumes described under Alternative 3. Groundwater treatment, however, would consist of the installation of extraction wells in source areas and the southeast corner of the site. Groundwater would be extracted through these wells and treated on site through activated carbon units or an air stripper with discharge to surface water or re-injection.

Similar to Alternatives 2 and 3, this alternative would also include a site cover to limit contact with residual SVOC-impacted soil and would include measures to mitigate any vapor intrusion impacts in adjacent off-site buildings identified during the remedial design. In addition, a site management plan would be developed stipulating development and usage restrictions. It is estimated that this alternative could be designed in 6 months with a duration of operation of 10 years.

Alternative 5: Soil Excavation, Groundwater Extraction and Treatment

Present Worth: *$2,940,000*
Capital Cost: *$2,790,000*
Annual OM&M:
(Years 1-2): *$61,000*
(Years 3-4): *$21,000*

This alternative would be similar to Alternative 3 except that it would involve additional soil excavation to reduce levels of SVOCs below SCGs rather than the use of a site cover. For cost estimating purposes it is assumed that two feet of soil would require excavation over the entire site, however, verification sampling would confirm actual excavation limits. The excavated soil would be characterized and it is assumed that disposal would be to an off-site disposal facility as non-hazardous waste. Excavated areas would be backfilled with clean fill. Since all wastes would be eliminated from the site, institutional controls would not be necessary. It is estimated that this alternative could be designed in 6 months, with implementation over a one to two year period to meet remedial objectives

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of environmental restoration projects in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the RA report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 1.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the SI/RA reports and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the NYSDEC will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The NYSDEC is proposing Alternative 3, soil excavation, *in situ* groundwater chemical oxidation and a site cover as the remedy for this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the SI and the evaluation of alternatives presented in the RAR.

Alternative 3 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the wastes and soil that create the most significant threat to public health and the environment, it would eliminate the source of contamination to groundwater, and it would create the conditions needed to restore groundwater quality to the extent practicable. It is also capable of treating off-site groundwater contamination a relatively short distance downgradient of the site and can be implemented in the shortest time period minimizing site disturbance during its period of treatment. Alternatives 2 and 4 would also comply with the threshold selection criteria but to a lesser degree or with lower certainty.

Because Alternatives 2, 3, 4 and 5 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives 2 (excavation/SVE/air sparging/site cover), 3 (excavation/ chemical oxidation/site cover), 4 (excavation/groundwater extraction and treatment/site cover), and 5 (excavation/chemical oxidation) all would have short-term impacts which can easily be controlled. The time needed to achieve the remediation goals for wastes and heavily contaminated soil would be similar for all alternatives. However, achieving SCGs for the remaining, lower impacted soil would be longer for Alternative 2. Achieving groundwater goals would take longest (10 years) for Alternative 4, 3 to 5 years for Alternative 2 and 1 to 2 years for Alternatives 3 and 5.

All alternatives would be equally effective over the long-term as wastes and VOC-impacted soil would be removed, SVOC-impacted soil would be covered or removed, and on-site groundwater would be treated to standards. Alternative 5 would be slightly more effective as SVOC-contaminated soil would be removed and would not rely on maintenance of a site cover and institutional controls.

All alternatives would equally reduce the toxicity, mobility and volume of VOC-impacted soil and wastes through removal or in-situ treatment. Alternative 5 would provide further volume reduction by removal of the additional SVOC-impacted soil. However, SVOCs have low mobility and exposure could be mitigated through maintenance of a site cover. Alternative 2 could reduce the migration of VOCs through the soil vapor possibly eliminating the need for any mitigative vapor intrusion measures for off-site buildings. All alternatives would be capable of treating on-site groundwater to standards, although Alternatives 3 and 5 would also be capable of treating off-site groundwater contamination.

In terms of implementability, all alternatives would involve commonly available technologies. Each would require demolition of the building and wash rack to excavate soils under these areas. Alternative 2 would require a pilot test to determine the effectiveness of SVE under the site conditions. Soil heterogeneity could negatively impact the effectiveness of SVE at this site. Piping associated with the SVE/air sparging system could obstruct full use of the property by a future developer during the treatment period. Alternatives 3 and 5 would also require a pilot test to determine the effectiveness of chemical oxidation in treatment of the groundwater at this site, but this technology has proven effective on other sites. Alternative 4 would require compliance with discharge limits for the treated groundwater and discharge options could be limited. Alternative 5 would be more difficult to implement due to the removal of SVOC-impacted soil and could become impractical if impacted areas are more widespread than currently estimated.

The cost of the alternatives varies significantly. Alternative 2 and 3 would be the least expensive alternatives and similar in cost. Alternative 4 would be the most expensive due to the high costs associated with operation and maintenance of a groundwater treatment system. Alternative 5 would be more costly than Alternatives 2 and 3 due to the extra cost for removal of the SVOC-impacted soil as opposed to maintaining a cover over these soils. The additional cost for removal of the SVOC-impacted soil is not considered to be justified due to the significantly higher cost to remove this soil.

The estimated present worth cost to implement the remedy is $1,580,000. The cost to construct the remedy is estimated to be $1,430,000 and the estimated average annual operation, maintenance, and monitoring costs for 2 years is $61,000.

The elements of the proposed remedy, as presented in Figures 7 and 8, are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. A pre-design investigation to determine the extent of off-site groundwater and vapor contamination. The results of this sampling would be evaluated to determine the need for off-site remedial measures and the need for vapor mitigation measures at the off-site buildings.

3. Demolition of the former Provan Ford operations building and wash rack to facilitate soil excavation and LNAPL removal from under those areas.

4. Excavation of subsurface soils visibly impacted with LNAPL and/or containing VOCs in excess of SCGs to mitigate human contact and migration of contaminants into the groundwater. The approximate limits of the remedial areas are shown in Figure 7, estimated to be a total of 5,800 cubic yards of soil.

5. LNAPL recovery from open excavation areas.

6. Off-site treatment/disposal of excavated soil and LNAPL at an appropriate, NYSDEC approved disposal facility.

7. Removal, cleaning and off-site disposal of the 8,000 gallon UST present under the wash rack area.

8. Backfill excavated areas with un-impacted overlying soil or clean fill.

9. Treatment of on-site groundwater to mitigate off-site migration of contaminants and to reduce VOC concentrations to groundwater standards, to the extent feasible, using *in situ* chemical oxidation.

10. A soil cover would be constructed over all vegetated areas to prevent exposure to contaminated soils. The one foot thick cover would consist of clean soil underlain by an indicator such as orange plastic snow fence to demarcate the cover soil from the subsurface soil. The top six inches of soil would be of sufficient quality to support vegetation. Clean soil would constitute soil with no analytes in exceedance of NYSDEC TAGM 4046 soil cleanup objectives or local site background as determined by the procedure in DER 10 ("Tech Guide"). Non-vegetated areas (buildings, roadways, parking lots, etc) would be covered by a paving system or concrete at least 6 inches in thickness.

11. Since the remedy results in contamination above unrestricted levels remaining at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address residual contaminated soils that may be excavated from the site during future redevelopment. The plan would require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (c) provide for the operation and maintenance of the components of the remedy; and (d) identify any use restrictions on site development or groundwater use.

12. The SMP will require the property owner to provide an Institutional Control/ Engineering Control (IC/EC) certification, prepared and submitted by a professional engineer or site representative acceptable to the Department annually or for a period to be approved by the NYSDEC, which would certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation an maintenance or soil management plan.

13. Imposition of an institutional control in form of an environmental easement that would: (a) require compliance with the approved site management plan, (b) limit the use and development of the property to commercial or industrial uses only; (c) restrict use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Orange County Department of Health; and, (d) require the property owner to complete and submit to the NYSDEC IC/ EC certification.

14. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the NYSDEC determines that continued operation is technically impracticable or not feasible.

15. Since the remedy results in untreated hazardous substances remaining at the site, a long term monitoring program would be instituted. The monitoring would inspect the integrity of the site cover on an annual basis. If groundwater standards are not achieved, post remedial groundwater monitor program would be performed. This program would allow the effectiveness of the remediation and site cover to be monitored and would be a component of the operation, maintenance, and monitoring for the site.

TABLE 1
Nature and Extent of Contamination
May 2001 – December 2003

SUBSURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Shallow Soil (0-6 inches below pavement/gravel)				
Semivolatile Organic Compounds (SVOCs)	Benzo(a)anthracene	ND[c]-23	0.224	16/20
	Chrysene	ND-26	0.400	13/20
	Benzo(b)floranthene	ND-30	1.1	11/20
	Benzo(k)floranthene	ND-22	1.1	9/20
	Benzo(a)floranthene	ND-29	0.061	19/20
	Indeno(1,2,3-cd)pyrene	ND-2	3.2	0/20
	Dibenzo(a,h)anthrocene	ND-0.5	0.014	11/20
	Total SVOCs	1.9-576	500	1/20
Inorganic Compounds	Chromium	9-17	50	0/12
	Lead	22-198	500	0/12
	Nickel	10-23	13	10/12
	Zinc	53-194	20	12/12

TABLE 1 (Cont.)
Nature and Extent of Contamination
May 2001 – December 2003

SUBSURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Deeper Soil (depth varies)				
Volatile Organic Compounds (VOCs)	Benzene	ND-12	0.06	24/90
	Toluene	ND-260	0.7	19/90
	Ethylbenzene	ND-120	5.5	18/90
	Xylenes	ND-320	1.2	39/90
	Methylene Chloride	ND-4.3	0.1	2/63
	1,1,1-TCA	ND-90	0.8	7/63
	TCE	ND-1,500	0.7	7/63
	PCE	ND-820	1.4	5/63
	Vinyl Chloride	ND-0.01	0.2	0/63
Semivolatile Organic Compounds (SVOCs)	Benzo(a)anthracene	ND-33	0.224	16/48
	Chrysene	ND-56	0.400	15/48
	Benzo(b)floranthene	ND-35	1.1	11/48
	Benzo(k)floranthene	ND-29	1.1	10/48
	Benzo(a)pyrene	ND-33	0.061	29/48
	Indeno(1,2,3-cd)pyrene	ND-4	3.2	1/44
	Dibenzo(a,h)anthrocene	ND-1	0.014	13/44
	Total SVOCs	ND-1,375	500	2/20
Inorganic Compounds	Chromium	11-38	50	0/9
	Lead	12-311	500	0/9
	Nickel	11-25	13	8/9
	Zinc	49-371	20	9/9

TABLE 1 (Cont.)
Nature and Extent of Contamination
May 2001 – December 2003

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Shallow Aquifer				
Volatile Organic Compounds (VOCs)	Benzene	ND-11,000	0.7	9/12
	Ethylbenzene	ND-5,400	5	8/12
	Toluene	ND-37,000	5	8/12
	Xylenes	ND-25,600	5	8/12
	cis 1,2-DCE	ND-120,000	5	10/12
	1,1-DCA	ND-2,500	5	4/12
	1,1-DCE	ND-110	5	2/12
	1,2-DCA	ND-14,000	5	2/12
	Methylene Chloride	ND-5,600	5	4/12
	1,1,1-TCA	ND-44,000	5	3/12
	TCE	ND-360,000	5	5/12
	PCE	ND-120,000	5	4/12
	Vinyl Chloride	ND-5,000	2	6/12

TABLE 1 (Cont.)
Nature and Extent of Contamination
May 2001 – December 2003

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Intermediate Aquifer				
Volatile Organic Compounds (VOCs)	Benzene	3.8-5.2	0.7	3/4
	Ethylbenzene	ND	5	0/4
	Toluene	ND-67	5	1/4
	Xylenes	ND-333	5	1/4
	cis 1,2-DCE	930-2,100	5	4/4
	1,1-DCA	8.3-28	5	3/4
	1,1-DCE	ND-15	5	2/4
	1,2-DCA	ND-23	5	1/4
	Methylene Chloride	ND	5	0/4
	1,1,1-TCA	52-230	5	4/4
	TCE	ND-300	5	2/4
	PCE	4.5-60	5	2/4
	Vinyl Chloride	9-190	2	4/4
Deep (Bedrock) Aquifer				
Volatile Organic Compounds (VOCs)	*All VOCs were below detection limits.*			0/4

TABLE 1 (Cont.)
Nature and Extent of Contamination
May 2001 – December 2003

SOIL GAS	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Total No. Of Samples
Volatile Organic Compounds (VOCs)	Benzene	ND-3190	NA	21
	Ethylbenzene	ND-0.87	NA	21
	Toluene	ND-27	NA	21
	Xylenes	ND-4	NA	21
	cis 1,2-DCE	ND-590	NA	4
	1,1-DCE	ND-40	NA	4
	1,1,1-TCA	ND-310	NA	4
	TCE	ND-913	NA	4
	PCE	ND	NA	4
	Vinyl Chloride	ND-1680	NA	4

INDOOR AIR	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Total No. of Samples
Volatile Organic Compounds (VOCs)	Benzene	4-214	NA	2
	Ethylbenzene	ND-48	NA	2
	Toluene	8-49	NA	2
	Xylenes	ND-96	NA	2
	cis 1,2-DCE	ND-20	NA	2

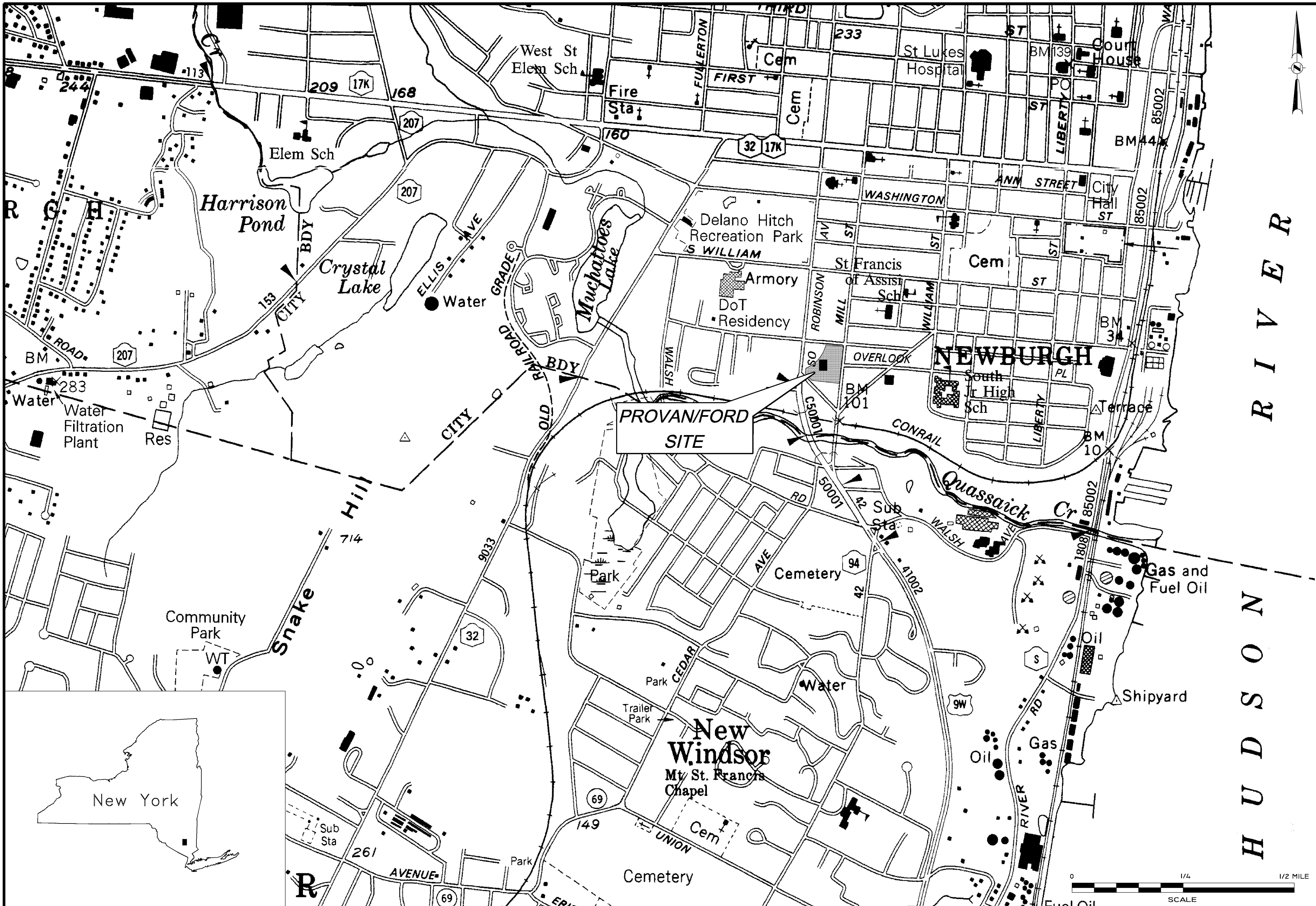
[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
ug/m^3 = micrograms per cubic meter

[b] SCG = standards, criteria, and guidance values;

[c]ND = non detect.

Table 2
Remedial Alternative Costs

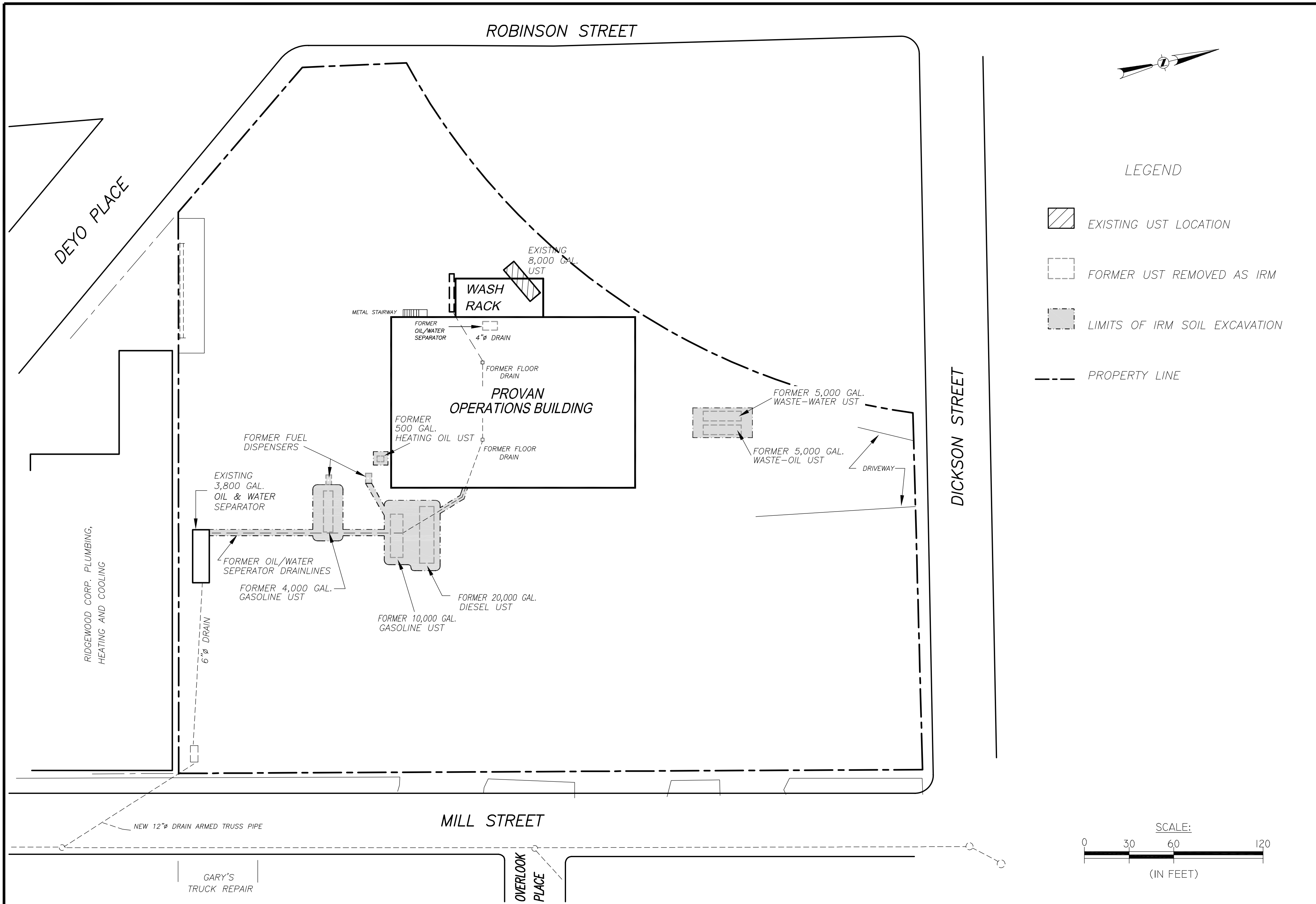
Remedial Alternative	Capital Cost	Annual OM&M	Total Present Worth
1. No Further Action	$0	$21,000	$323,000
2. Soil Excavation\SVE, Groundwater Air Sparging and Site Cover	$1,320,000	$36,000	$1,510,000
3. Soil Excavation, *In Situ* Groundwater Chemical Oxidation and Site Cover	$1,430,000	$61,000	$1,580,000
4. Soil Excavation, Groundwater Extraction & Treatment and Site Cover	$1,640,000	$150,000	$2,820,000
5. Soil Excavation, *In Situ* Groundwater Chemical Oxidation and Site Cover	$2,790,000	$61,000	$2,940,000



Provan Ford Site
Newburgh, Orange County, New York

SITE LOCATION MAP

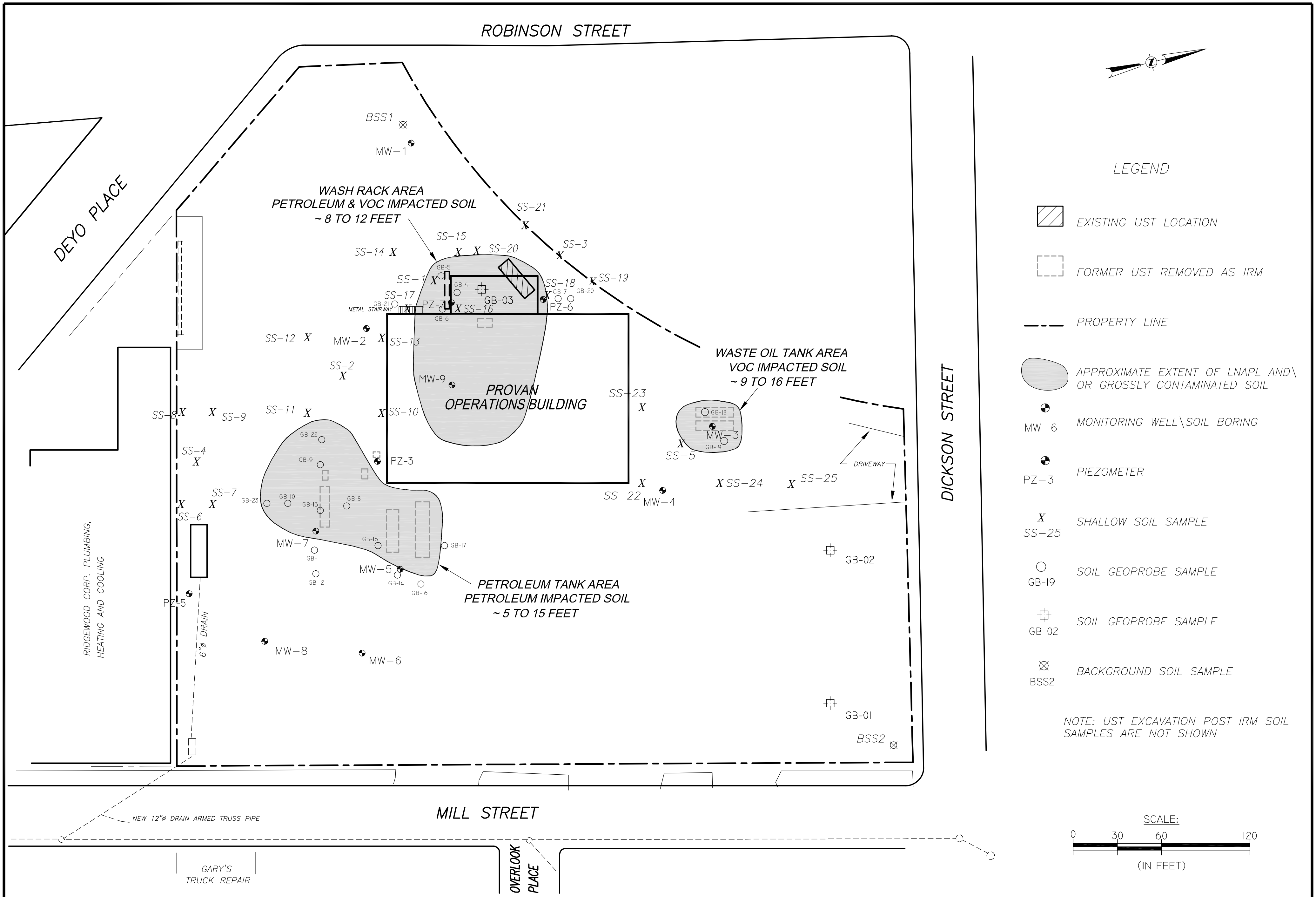
FIGURE 1



Provan Ford Site
Newburgh, Orange County, New York

SITE MAP

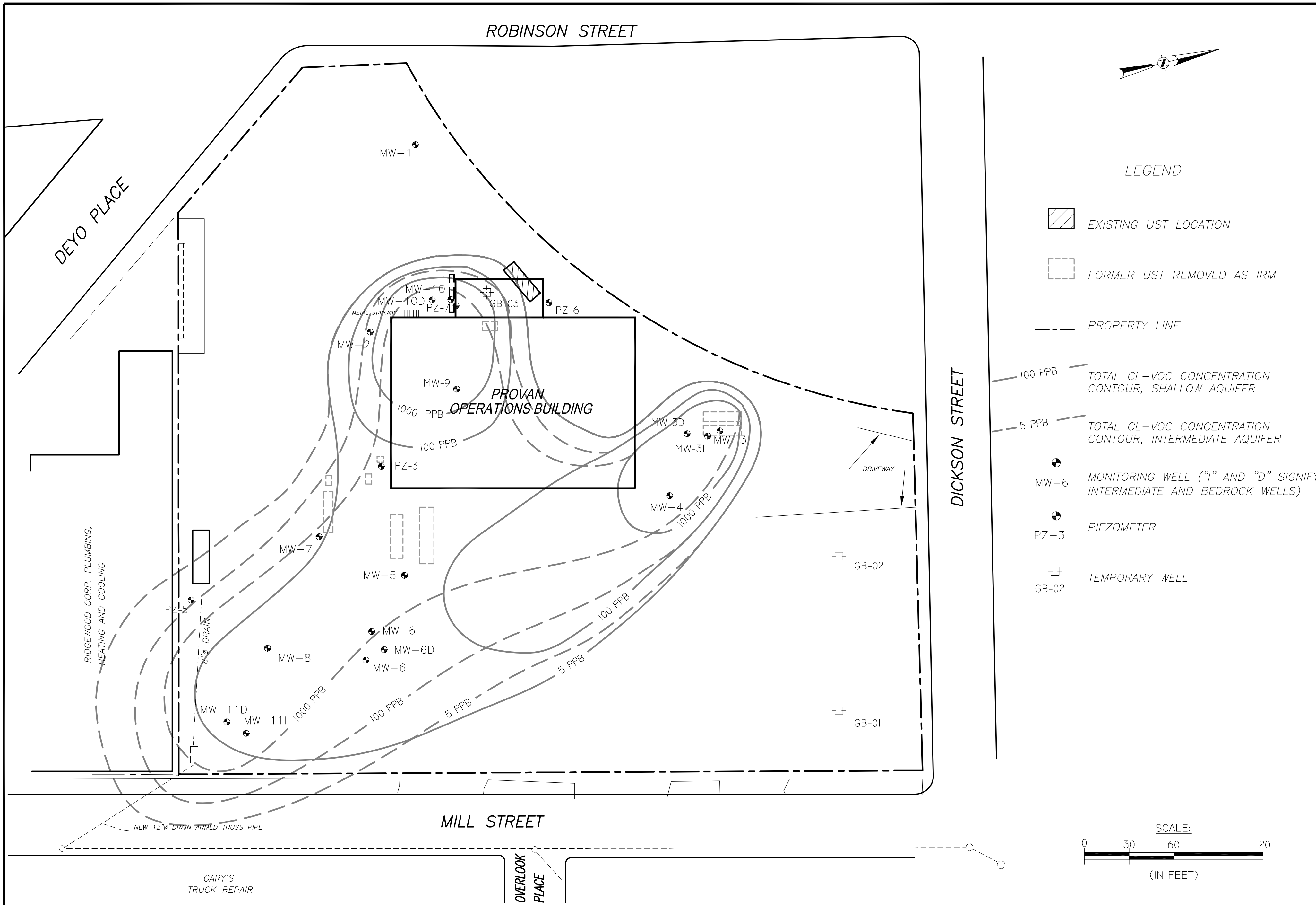
FIGURE 2



PROVAN FORD SITE
NEWBURGH, ORANGE COUNTY, NEW YORK

EXTENT OF LNAPL AND GROSSLY CONTAMINATED SOIL

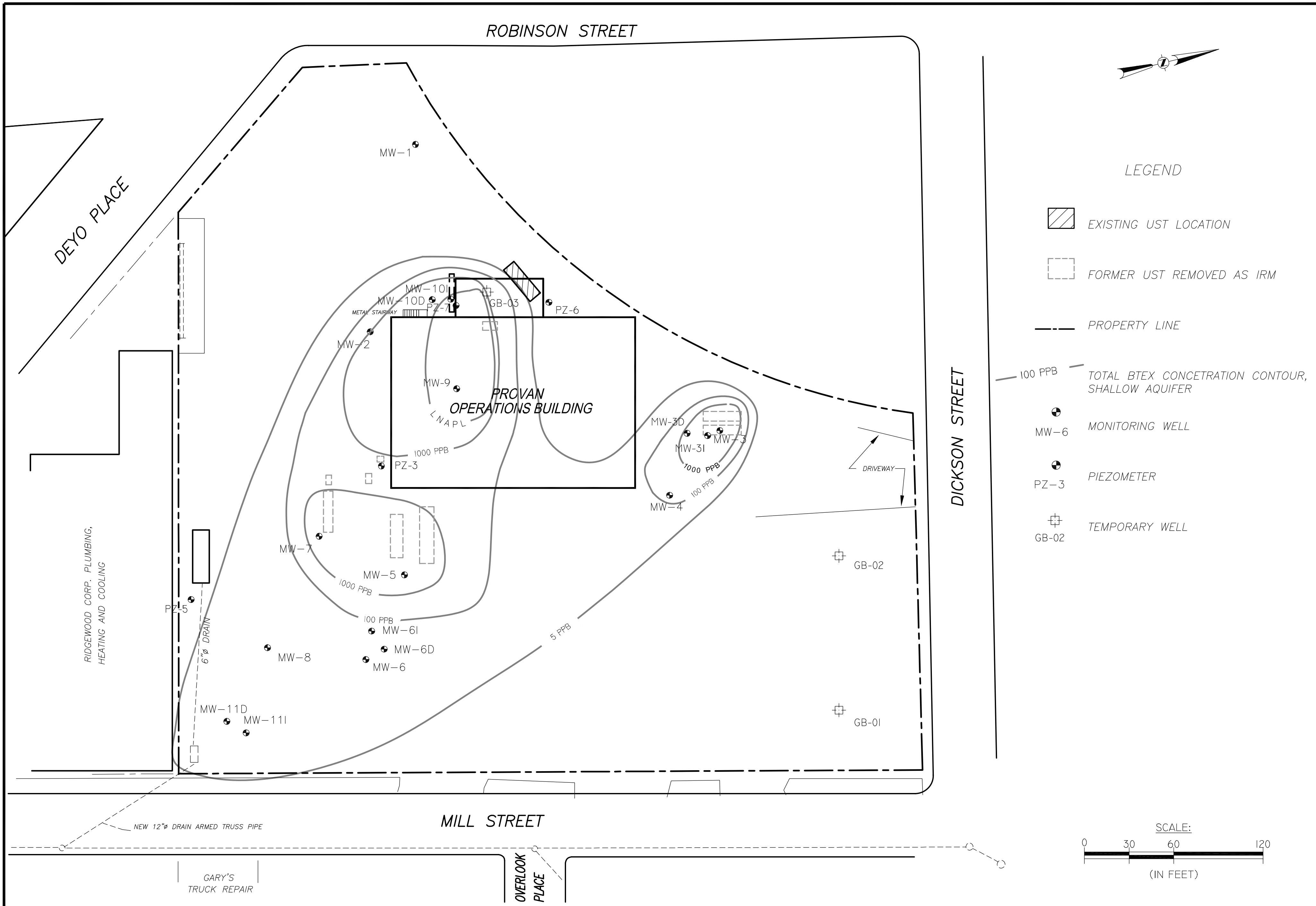
FIGURE 3



Provan Ford Site
Newburgh, Orange County, New York

EXTENT OF GROUNDWATER CONTAMINATION (CHLORINATED VOCs)

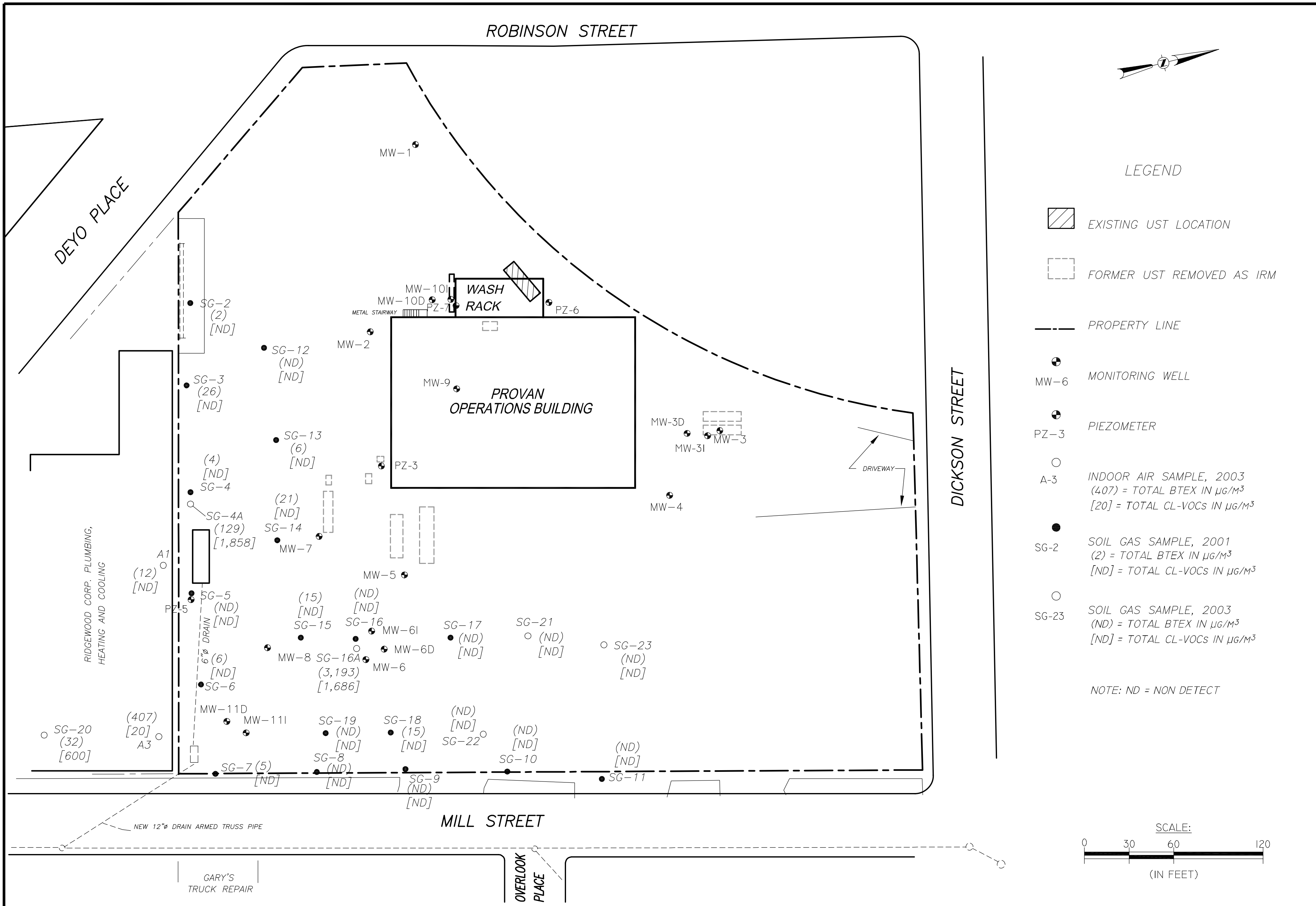
FIGURE 4



Provan Ford Site
Newburgh, Orange County, New York

EXTENT OF GROUNDWATER CONTAMINATION (TOTAL BTEX)

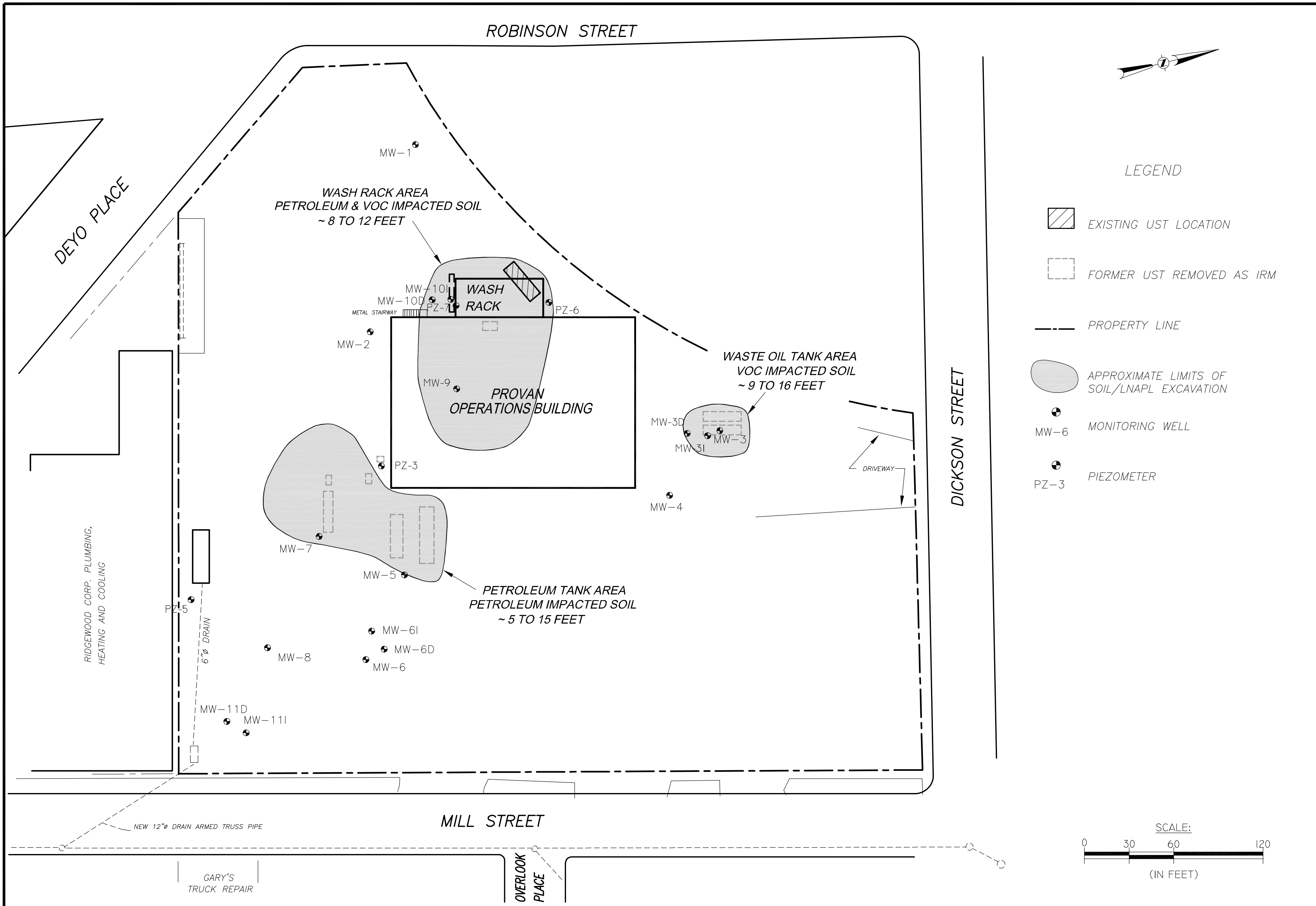
FIGURE 5



Provan Ford Site
Newburgh, Orange County, New York

SOIL GAS AND INDOOR AIR SAMPLE LOCATIONS

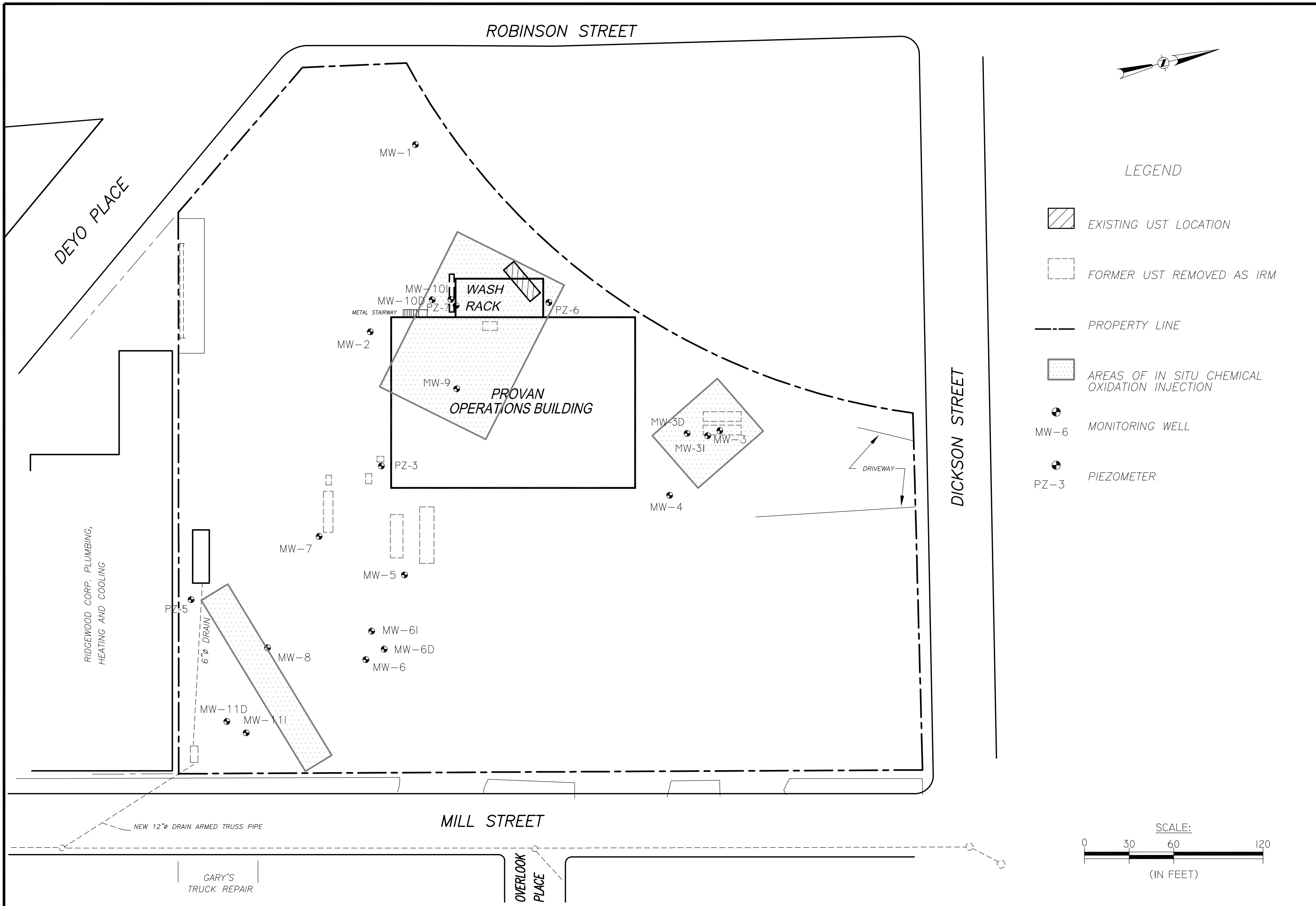
FIGURE 6



Provan Ford Site
Newburgh, Orange County, New York

PROPOSED SOIL REMEDIATION

FIGURE 7



Provan Ford Site
Newburgh, Orange County, New York

PROPOSED GROUNDWATER REMEDIATION

FIGURE 8